

WHAT IS CLAIMED IS:

1. A method of lightening a skin region or hair of a subject, the method comprising applying to the skin region or hair at least one type of a lignin modifying enzyme in a manner suitable for oxidizing a pigment contained within cells of the skin region or hair.

2. The method of claim 1, wherein said lignin modifying enzyme is lignin peroxidase.

3. The method of claim 2, wherein said lignin peroxidase is isoenzyme H1 or a modified form of isoenzyme H2.

4. The method of claim 1, wherein said applying is effected via a topical application of a preparation including said at least one type of lignin modifying enzyme.

5. The method of claim 1, wherein said applying is effected via intradermal or subcutaneous administration of a preparation including said at least one type of lignin modifying enzyme.

6. The method of claim 1, wherein said at least one type of said lignin modifying enzyme is included in a composition formulated for skin or hair application.

7. The method of claim 6, wherein said composition further comprises an electron acceptor.

8. The method of claim 6, wherein said composition further comprises veratryl alcohol.

9. The method of claim 6, wherein said composition comprises at least one type of an epidermal penetrant.

10. The method of claim 6, wherein said composition comprises at least one type of a hair penetrant.

11. The method of claim 1, wherein said applying is effected for a time period selected according to a level of lightening desired.

12. A cosmetic composition for lightening a skin region or hair of a subject comprising at least one type of a lignin modifying enzyme and a cosmetically acceptable carrier.

13. The cosmetic composition of claim 12, wherein said at least one type of said lignin modifying enzyme is lignin peroxidase.

14. The cosmetic composition of claim 13, wherein said lignin peroxidase is isoenzyme H1 or a modified form of isoenzyme H2.

15. The cosmetic composition of claim 12, further comprising an electron acceptor.

16. The cosmetic composition of claim 15, wherein said electron acceptor is hydrogen peroxide.

17. The cosmetic composition of claim 12, wherein said cosmetically acceptable carrier includes transcutol and/or butylene glycol.

18. The cosmetic composition of claim 12, wherein said cosmetically acceptable carrier includes alkanol amines.

19. The cosmetic composition of claim 13, wherein said lignin peroxidase is provided at a concentration of at least 1 U/gr.

20. The cosmetic composition of claim 16, wherein said hydrogen peroxide is provided at a concentration of at least 0.005 %.

21. The cosmetic preparation of claim 12, further comprising veratryl alcohol.

22. The cosmetic preparation of claim 21, wherein said veratryl alcohol is provided at a concentration of at least 0.05 %.

23. A kit for lightening a skin region or hair comprising a first container including a lignin modifying enzyme, and a second container including an electron acceptor.

24. The kit of claim 23, wherein said first container further comprises veratryl alcohol.

25. The kit of claim 23, wherein said lignin modifying enzyme included in said first container is lignin peroxidase.

26. The kit of claim 25, wherein said lignin peroxidase is isoenzyme H1 or a modified form of isoenzyme H2.

27. The kit of claim 23, wherein said electron acceptor included is hydrogen peroxide.

28. The kit of claim 24, wherein said veratryl alcohol is provided in a concentration of at least 0.05 %.

29. The kit of claim 25, wherein said lignin peroxidase is provided at a concentration of at least 1 U/gr.

30. The kit of claim 27, wherein said hydrogen peroxide is provided at a concentration of at least 0.005 %.

31. The kit of claim 23, wherein said first and/or second container(s) further include a cosmetically acceptable carrier suitable for epidermal penetration.

32. The kit of claim 23, wherein said first and/or second container further include a cosmetically acceptable carrier suitable for hair penetration.

33. The kit of claim 31, wherein said cosmetically acceptable carrier includes transcitol and/or butylene glycol.

34. The kit of claim 32, wherein said cosmetically acceptable carrier includes alkanol amines.

35. An article-of-manufacturing comprising packaging material and a cosmetic composition identified for lightening a skin region or hair of a subject, said cosmetic composition being contained within said packaging material, said cosmetic composition including, as an active ingredient, a lignin modifying enzyme, and a cosmetically acceptable carrier.

36. The article-of-manufacturing of claim 35, wherein said lignin modifying enzyme is lignin peroxidase.

37. The article-of-manufacturing of claim 36, wherein said lignin peroxidase is isoenzyme H1 or a modified form of isoenzyme H2.

38. The article-of-manufacturing of claim 35, wherein said cosmetic composition further comprises an electron acceptor.

39. The article-of-manufacturing of claim 35, wherein said cosmetic composition further comprises veratryl alcohol.

40. The article-of-manufacturing of claim 38, wherein said electron acceptor is hydrogen peroxide.

41. The article-of-manufacturing of claim 35, wherein said cosmetically acceptable carrier includes compositions suitable for epidermal or hair penetration.

42. A method of lightening a skin region of a subject, the method comprising, expressing within cells of the skin region a lignin modifying enzyme in a manner suitable for oxidizing a pigment contained within cells of the skin region.

43. The method of claim 42, further comprising a step of providing to said cells of the skin region an electron acceptor.

44. The method of claim 43, wherein said electron acceptor is hydrogen peroxide.

45. The method of claim 42, further comprising a step of providing to said cells of the skin region veratryl alcohol.

46. The method of claim 42, wherein expressing is effected by introducing into said cells an expression vector capable of expressing said lignin modifying enzyme.

47. The method of claim 46, wherein said expression vector is a viral vector.

48. The method of claim 46, wherein said expression vector comprises a promoter functionally linked to a lignin modifying enzyme coding sequence.

49. The method of claim 48, wherein said lignin modifying enzyme is lignin peroxidase.

50. The method of claim 49, wherein said lignin peroxidase is encoded by the polynucleotide sequence set forth in SEQ ID NO:1.

51. A method of producing a lignin peroxidase comprising:
(a) culturing *Phanerochaete chrysosporium* fungus on a porous matrix in a stirred and aerated culture medium containing glycerol for a predetermined time period;

(b) following said predetermined time period extracting a soluble fraction from said *Phanerochaete chrysosporium* fungus to thereby produce the lignin peroxidase.

52. The method of claim 51, wherein said culture medium is devoid of manganese ions.

53. The method of claim 51, wherein said aerated culture is obtained by subjecting said culture medium to an aeration rate in the range of 0.1-1 liter per liter per minute.

54. The method of claim 51, wherein said culturing is effected at a temperature of 37 °C.

55. The method of claim 51, wherein said stirred culture medium is obtained by stirring said culture medium at a speed in the range of 50-300 rpm.

56. The method of claim 51, wherein said stirred culture medium is obtained by stirring said culture medium at a speed of 160 rpm.

57. The method of claim 51, wherein said predetermined time period is selected from the range of 3-10 days.

58. The method of claim 51, wherein said predetermined time period is 7 days.

59. The method of claim 51, wherein said glycerol is provided at a concentration range of 3-20 grams per liter.

60. The method of claim 51, wherein said glycerol is provided at a concentration of 6 grams per liter.

61. The method of claim 51, wherein said culture medium further includes veratryl alcohol.

62. The method of claim 61, wherein said veratryl alcohol is provided at a concentration range of 0.5-4 mM.

63. The method of claim 61, wherein said veratryl alcohol is provided at a concentration of 2 mM.

64. The method of claim 51, wherein said lignin peroxidase is isoenzyme H1 or a modified form of isoenzyme H2.

65. The method of claim 51, wherein said porous matrix is a polyurethane foam.

66. An aqueous extract of *Phanerochaete chrysosporium* fungus exhibiting lignin peroxidase enzymatic activity in the range of 500-2000 units per liter.

67. The aqueous extract of claim 66, wherein said lignin peroxidase activity is 1500 units per liter.

68. The aqueous extract of claim 65, wherein said lignin peroxidase enzymatic activity is isoenzyme H1 or a modified form of isoenzyme H2.